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May 4, 2020

Ms. Paula Wilson
Idaho Department of Environmental Quality
1410 N. Hilton
Boise, ID 83706

Submitted via email: paula.wilson@deq.idaho.gov

Re: DEQ Negotiated Rulemaking – Ore Processing by Cyanidation
Docket No. 58-0113-1901 (Negotiated Rule Draft No. 6)

Dear Ms. Wilson:

The Idaho Mining Association (IMA) appreciates the opportunity to provide the following comments to the subject draft rule.

Some recent U.S. and Canadian research has come to our attention that confirms many of the points we have been making in regard to geo-composite liner systems, particularly for tailings storage facilities. We plan a more formal response closer to the Draft 6 comment deadline, but at this time would like to direct IDEQ and other stakeholders' attention to an excellent summary of the issues at hand, along with supporting documentation. In the video linked below, Dr. R. Kerry Rowe, Professor and Canada Research Chair in Geotechnical and Geoenvironmental Engineering at Queen's University, Kinston, Ontario, presents the prestigious 53rd annual Karl Terzaghi Lecture "Protecting the Environment with Geosynthetics: Successes and Challenges." Here is the link for your perusal: https://www.youtube.com/watch?v=vyLpkObB1a8

Dr. Rowe's lecture, and several related recent papers by him and others, based on laboratory and field-scale research, support several key conclusions relating to liner systems. This represents the best available science on liners that we have been able to locate, and we hope will form the basis of a modernized Cyanidation rule:

1. Geosynthetic Clay Liners (GCLs) are superior (i.e., 10 to 100 times lower leakage, ~24:20 in video) when compared to compacted clay in composite liner systems due to the effects of inevitable isolated coarse particles in compacted clay, cracking of clay,

interaction with liner wrinkles, and the resultant effects on transmissivity at the interface between the clay and overlying geomembrane.

2. Tailings particles infill holes (Garlanger et al; Rowe et al 2017), and in combination with the low permeability of the tailings mass reduce leakage rates substantially, even at higher heads (~14:20 in video), than would occur for free-draining material such as Municipal Solid Waste (MSW) or crushed ore, in a landfill or on a leach pad, respectively.
3. Tailings placed in direct contact with geomembrane defects (punctures, tears, and wrinkles) leads to low and declining leakage rates with increased applied vertical stress (Joshi et al 2016).
4. Installation of a high-permeability over-liner material (gravel, etc.) circumvents the processes identified in 2 and 3, and so these layers represent an environmental liability when overlain by fine tailings even without consideration of the potential for liner damage during their installation and microstrains that later become leaks, and are "not considered…a good practice" (Joshi & McLeod 2018; Rowe et al 2017).
5. Best-practices to reduce tensile strain, and moderate temperatures seen in a TSF, support liner lifespans of hundreds of years – 880 years at 95^{o}F. (~49:09 in video; Ewais & Rowe, unpublished). Minimizing liner wrinkles, using a GCL in a composite liner, and avoiding use of gravel in contact with liner are key to achieving liner longevity.
6. A systems approach is essential for evaluation of the subgrade – liner – stored material system, rather than considering component properties in isolation.

Taken together, these points support the idea that the best available tailings liner system consists of a chemically compatible, high-quality GCL overlain by a chemically compatible, high-quality geomembrane, with low-permeability tailings immediately above the geomembrane.

Thanks again for the opportunity to comment on the draft Rule. IMA appreciates the efforts IDEQ has made so far in modernizing the subject rule.

Kindest Regards,

Benjamin J. Davenport

Enclosures: